

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2001-117033

(P2001-117033A)

(43) 公開日 平成13年4月27日 (2001.4.27)

(51) IntCl<sup>7</sup>

G 0 2 B 26/10

識別記号

F I

G 0 2 B 26/10

フィード (参考)

D 2 H 0 4 5

審査請求 未請求 請求項の数 9 O L (全 6 頁)

(21) 出願番号

特願平11-294416

(22) 出願日

平成11年10月15日 (1999. 10. 15)

(71) 出願人 000006747

株式会社リコー

東京都大田区中馬込1丁目3番6号

(72) 発明者 上田 健

東京都大田区中馬込1丁目3番6号 株式会社リコー内

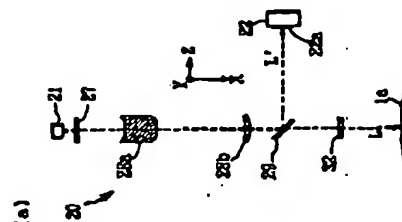
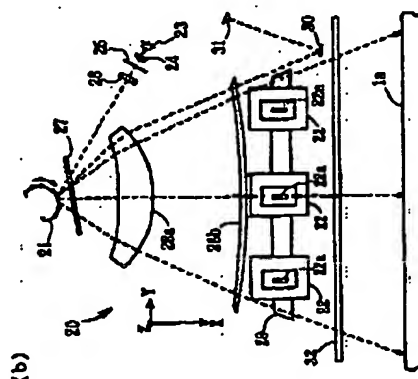
Fターム (参考) 2H045 AA01 BA02 BA22 BA34 CA32 CA82

(54) 【発明の名称】 画像形成装置

(57) 【要約】

【課題】 書き手段の走査線曲がり測定し、色味の違いや色ずれを補正可能なカラー画像形成装置を提供する。

【解決手段】 複数の感光体と、該感光体の各々へ独立してレーザ走査を行う複数の書き手段20とを有し、上記各書き手段20の走査により形成された各感光体上の静電潜像を各色の顕像に現像した後、該各色の顕像を転写材上に順次重ね転写する画像形成装置において、上記各書き手段20で走査される光束をハーフミラー29により分割し、分割した一方の光束L'を各CCDセンサ22へ導くことによって各像高での副走査方向Zの走査位置を相対的に測定するとともに、上記ハーフミラーの手前に平行屈折面を回動自在に備えることにより走査線曲がりを補正可能な制御手段を備えた構成である。



BEST AVAILABLE COPY

## 【特許請求の範囲】

【請求項1】 複数の回転自在な感光体と、回転する感光体の各々へ独立してレーザ走査を行う複数の書込手段とを有し、該書込手段は少なくとも、光源と、該光源からのレーザ光束を主走査方向に偏向する光偏向手段と、偏向するレーザ光束を感光体面に結像する走査用レンズとからなり、上記各々の書込手段のレーザ走査により形成された各感光体上の静電潜像を対応する各色の顕像に現像した後、該各色の顕像を転写材上に重ね合わせて転写する画像形成装置において、

上記各書込手段で走査されるレーザ光束をCCDセンサへ導くことによって、各書込手段の走査線曲がり量を測定する測定手段を備えたことを特徴とする画像形成装置。

【請求項2】 上記測定手段が、上記光偏向手段で偏向されるレーザ光束を、感光体面に入射する第1の光束と、上記CCDセンサに入射する第2の光束とに分割する光束分離手段を有することを特徴とする請求項1記載の画像形成装置。

【請求項3】 上記光束分離手段が、上記光偏向手段と感光体面との間に設けられたハーフミラーであることを特徴とする請求項2記載の画像形成装置。

【請求項4】 上記第1の光束が主走査方向に偏向されたときの第2の光束の移動軌跡上に沿って複数のCCDセンサを配置したことを特徴とする請求項2又は3記載の画像形成装置。

【請求項5】 各書込手段に対して少なくとも1つのCCDセンサが配置され、該CCDセンサを上記第2の光束の移動軌跡上に沿って移動させる移動手段を備えたことを特徴とする請求項2又は3記載の画像形成装置。

【請求項6】 上記CCDセンサが、上記第2の光束の光軸と略垂直な平面内にある画素列の並び方向が上記第2の光束の移動軌跡と交わり且つ直交しないように設置されたことを特徴とする請求項2から5のいずれかに記載の画像形成装置。

【請求項7】 さらに、上記走査線の曲がりを補正する補正手段を備えたことを特徴とする請求項1から6のいずれかに記載の画像形成装置。

【請求項8】 上記補正手段は、上記光偏向手段で偏向されたレーザ光束の光軸を副走査方向へ微細移動させ、該レーザ光束の感光体へ結像する走査線の曲がり量を調整可能としたものであることを特徴とする請求項7記載の画像形成装置。

【請求項9】 上記補正手段は、上記光偏向手段と上記走査用レンズとの間に設置され透過するレーザ光束を副走査方向に沿って曲げる屈折面を備えた透明部材を有し、該透明部材を傾けることにより走査線の曲がり量を調節するものであることを特徴とする請求項8記載の画像形成装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、レーザプリンタ、デジタルPPC等の電子写真式の画像形成装置に関し、特に複数組の書込手段（光学走査系）及び被書込手段（感光体）を有し、各被書込手段に形成された像を重ね合わせて画像を形成する画像形成装置に関する。

【0002】

【従来の技術】 レーザプリンタ等の画像形成装置には、駆動機構により回転駆動される複数の感光体に対して独立して複数の書込手段により複数の異なった色の情報をそれぞれ走査線で書き込んで静電潜像を形成し、これらの静電潜像を複数の顕像化手段により異なった色の顕像にそれぞれ顕像化して転写材上に重ね合わせて転写しカラー画像を得るデジタルカラー複写機などの画像形成装置がある。上記書込手段の各々は、読み出される各色の画像情報信号に応じて駆動制御される半導体レーザ等からレーザ光束を射出する。レーザ光束は、多面鏡、レンズ等の光学部品を介して一様に帯電された感光体面に集光されるとともに像高方向に走査される。そして回転する感光体面には、所定ピッチの走査線として画像情報が書き込まれ、静電潜像が形成される。

【0003】 従来、上記のように複数の書込手段としてのレーザビーム走査装置を備えたカラー画像形成装置では、それぞれの書込手段において温度変化などを原因として走査装置内のレンズや光源位置にずれが発生することがある。このように内のレンズや光源位置がずれると、被走査面上のレーザスポットの移動軌跡、すなわち走査線の曲がり量に変化してしまう。レーザ光束の走査線の曲がり量が各色の書込手段で異なれば、異なる色の画像間隔のずれ、あるいは重なりにより色味の違いや色ずれが起りカラー画像の品質が低下する不具合があった。

【0004】 この種の不具合を防止するために、上記走査線の曲がり量の測定方法としては、例えば特開平9-90695号に記載されるように、複数組の発光素子及び受光素子からなる反射型フォトセンサを転写ベルトに向けて配列し、転写ベルト上の顕像を受光素子で捕らえ、顕像のずれを測定するといった方法が公知である。

【0005】

【発明が解決しようとする課題】 しかし、上記特開平9-90695号記載の測定方法では、顕像を照らす光源が必要となること、また4色の顕像を区別して捕らえるために各色対応の受光素子が必要になり、装置がコスト高となる。

【0006】 そこで、本発明は、各書込手段におけるレーザ光束の走査線曲がり量の変化を測定するための安価な手段を備え、さらに走査線曲がり量の変化による色味の違いや色ずれを補正可能な画像形成装置を提供することを目的としている。

【0007】

【課題を解決するための手段】 上記目的を達成する本発明の画像形成装置は、複数の回転自在な感光体と、回転

する感光体の各々へ独立してレーザ走査を行う複数の書込手段とを有し、該書込手段は少なくとも、光源と、該光源からのレーザ光束を主走査方向に偏向する光偏向手段と、偏向するレーザ光束を感光体面に結像する走査用レンズとからなり、上記各々の書込手段のレーザ走査により形成された各感光体上の静電潜像を対応する各色の顕像に現像した後、該各色の顕像を転写材上に重ね合わせて転写する画像形成装置において、上記各書込手段で走査されるレーザ光束をCCDセンサへ導くことによって、各書込手段の走査線曲りを測定する測定手段を備えた特徴としている。

【0008】上記測定手段が、上記光偏向手段で偏向されるレーザ光束を、感光体面に入射する第1の光束と、上記CCDセンサに入射する第2の光束とに分割する光束分離手段を有する構成とすることができる。この場合、上記光束分離手段が、上記光偏向手段と感光体面との間にハーフミラーを設ける構成にすることができる。

【0009】上記第1の光束が主走査方向に偏向されたときの第2の光束の移動軌跡上に沿って複数のCCDセンサを配置した構成とすることができる。または、各書込手段に対して少なくとも1つのCCDセンサが配置され、該CCDセンサを第2の光束の移動軌跡上に沿って移動させる移動手段を備えた構成としてもよい。またこの場合に、各CCDセンサが、上記第2の光束の光軸と略垂直な平面内にある画素列の並び方向が第2の光束の移動軌跡と交わり且つ直交しないように設置された構成にするよい。

【0010】さらに、上記走査線の曲りを補正する補正手段を備えた構成にすることができる。この場合、該補正手段は、上記光偏向手段で偏向されたレーザ光束の光軸を副走査方向へ微細移動させ、該レーザ光束の感光体へ結像する走査線の曲り量を調整可能とした構成とすることができる。またこの場合、上記補正手段は、上記光偏向手段と上記走査用レンズとの間へ設置され透過するレーザ光束を副走査方向に沿って曲げる屈折面を備えた透明部材を有し、該透明部材を傾けることにより走査線の曲り量を調節する構成にすることができる。

【0011】

【発明の実施の形態】以下、図面に基づいて本発明の一実施例を説明する。図1は、本実施例の画像形成装置の概略構成図である。この画像形成装置内は、画像読取部40と、画像処理部50と、プリンタ部60とからなり、プリンタ部60には書込手段20と、ドラム状の感光体1と、この感光体1廻りの作像部品とにより構成された作像装置が転写ベルト2上に4組並ぶように配置されている。これら複数の作像装置は、図1中右手から順にブラック（以下「BK」で示す）、シアン（以下「C」で示す）、マゼンタ（以下「M」で示す）、イエロー（以下「Y」で示す）の各色作像工程を分担する。ここでは、まず本装置の構成及び一連の作像動作を概説

する。

【0012】各作像装置では、それぞれがBK、C、M、Yの4色の顕像を形成し、順次形成される各色の顕像を転写材へ重ね転写することでフルカラー画像を得るようになっている。このため転写ベルト2は、駆動ローラ2a及び従動ローラ2b、2cに張架されて図示しない駆動源により駆動ローラ2aを介して回転駆動され、レジストローラ3から送られた転写材を搬送する。なお、この実施例では、BK、C、M、Yの4色の顕像を重ね合わせる構成であるが、これら4組の記録装置のうち、1組の記録装置を省略して3色の顕像を重ね合わせてカラー画像を得るようにしてもよい。

【0013】例えば、C顕像を形成する記録装置では、感光体1Cは、図示しない駆動機構により図1中の時計方向（書込手段20Cから見れば副走査方向である）へ回転駆動されて帯電チャージャ4Cからなる帯電手段により均一に帯電され、書込手段20Cによる露光で静電潜像が形成される。ここに、書込手段20Cは、画像処理部50からのCのデジタル画像信号によりレーザ駆動制御部で光源を駆動制御してCのデジタル画像信号により強度変調されたレーザビームを出射させ、このレーザ光束をポリゴンミラー21からなる光偏向手段で主走査方向（感光体1の軸方向）へ繰り返し偏向し、感光体1Cに走査線としてCの情報を書き込み静電潜像を形成する。また、上記Cの潜像形成と同様に、他の記録装置では、それぞれ感光体1BK、4M、4Yが回転駆動され、各々の帯電チャージャ4BK、4M、4Yにより均一に帯電され、書込手段20BKが感光体1BKに対し、書込手段20Mが感光体1Mに対し、書込手段20Yが感光体1Yに対し、各々の色の画像情報に応じた露光によって静電潜像が書き込まれる。

【0014】また、上記書込手段20BK～20Yのレーザビームを測定する手段の概略は、次のようである。上記各々の書込手段20BK～20Yの側には、それぞれ、CCDセンサからなるCCDユニット22BK、22C、22M、22Yが配置されている。そして感光体1へ向かうレーザ光束の一部が各書込手段20BK～20Y内から、各々のCCDユニット22BK～22Yへ導かれる。これら各書込手段20と、各CCDセンサ22とはCPU等の演算装置で構成される制御部51に接続されている。

【0015】潜像形成のつぎに、感光体1C上の静電潜像は、顕像化手段としての現像装置5CによりCTナーからなる1成分現像剤もしくはCTナーとキャリアからなる2成分現像剤により現像されてCの顕像となる。このC顕像の形成と同様に、感光体1BK、1M、1Y上の静電潜像は、各々、現像装置5BK、5M、5YによりBKトナー、Mトナー、Yトナーを含む現像剤でそれぞれ現像され、BK、M、Yの顕像となる。

【0016】上記画像形成動作に伴って、例えば2つの

給紙カセット6の何れかから給紙コロ7により転写紙Pからなる転写材がレジストローラ3へ給紙される。レジストローラ3は転写紙Pを各感光体1上の画像形成とのタイミングを取るようにして転写ベルト2へ送出し、転写ベルト2は転写紙Pを熱定着ローラ9方向へ搬送する。転写ベルト2上の転写紙Pは、転写ベルト2と感光体1BK、1C、1M、1Yとのニップ部を通過する際に、転写チャージャ8BK、8C、8M、8Yにより、順次に、感光体1BK上のBK画像、感光体1C上のC画像、感光体1M上のM画像、感光体1Y上のY画像が転写され、印字面にフルカラー画像が形成される。その後、転写紙Pは、熱定着ローラ9によりトナーが定着されて排紙ローラ10により外部へカラーコピーとして排出される。

【0017】また、感光体1BK、1C、1M、1Yはそれぞれ、画像転写後にクリーニング装置11BK、11C、11M、11Yによりクリーニングされて残留トナーが除去される。また、クリーニング装置12は転写ベルト2を転写紙搬送後にクリーニングする。

【0018】以下、上記画像形成装置のレーザ走査位置の測定手段、及びレーザ走査位置の補正手段について詳細に説明する。

【0019】図2は、図1の書込手段20周辺の構成を示す図で、同図(a)は側断面図、同図(b)は平面図である。これらの図に示すように、半導体レーザ23からなる光源から発せられたレーザ光束はコリメートレンズ24、アパーチャ25、シリンドリカルレンズ26、防音ガラス27を経て、図示しないモータで回転駆動されるポリゴンミラー21に達し偏向される。偏向されたレーザ光束は再び防音ガラス27を通り、走査用レンズ28a、28bを経て、光束分離手段であるハーフミラー29へ達する。

【0020】図2(a)に示すように、ハーフミラー29に達したレーザ光束のうち、ハーフミラー29を透過した第1の光束Lは、防音ガラス32を経て被走査面である感光体面1aに結像し走査線を書き込み、一方ではハーフミラー29で反射した第2の光束L'がCCDユニット22に入射する。

【0021】図2(b)に示すように、主走査方向Y(像高方向)に所定間隔を開けて3つのCCDユニット22が設置されている。すなわち、これらのCCDユニット22は、ポリゴンミラー21により偏向される第1の光束Lの走査に伴う上記第2の光束L'の走査軌跡上に、受光部としてのラインCCD22aを並列するものである。ポリゴンミラー21で偏向される第2の光束L'は、次々と3つのCCDユニット22へ入射し、これをポリゴンミラー21の走査面毎に繰り返すこととなる。なお、第1の光束Lのうち、主走査方向Yの一端側へ振られた一部のレーザが折り返しミラー30を経て、同期センサ31に入射する。

【0022】本実施例ではハーフミラー29が主走査方向Yに沿って設けられ、ポリゴンミラー21からの光束はほぼ直角に分割される。したがって、各ラインCCD22aはハーフミラー29のすぐ横、すなわち副走査方向Zへ所定距離離間してレーザ光束L'に対し垂直に向けられ、且つ主走査方向Xに等間隔で並ぶように取り付けられている。

【0023】また、各ラインCCD22aの画素列が、第2の光束L'の光軸に対し垂直な平面内にあって、この画素の並び方向が第1の光束Lの光軸に沿ったX方向に配置されている。すなわち、第1の光束Lが感光体面1aに書き込む走査線の副走査位置は、第2の光束L'の結像するX方向の画素位置により相対的に特定される。したがって、ラインCCD22a上のX方向の光重心を計れば、その像高における走査線の副走査位置を反映したものとなる。そして、走査領域内の3箇所に設けられたCCDユニット22の各出力は制御部51に取り込まれ、各像高での副走査位置が特定され走査線の曲がり測定される。

【0024】また、上記のハーフミラー29を用いた構成により、別途の光源を設けることなくレーザ光束を直接ラインCCD22aに導くことによって走査線の曲がりの測定が可能となり、また、各書込手段20毎に顕像化前の工程で測定されるためにCCDよりなる単色用の安価な受光素子で構わないのである。また、CCDセンサは、元々画素が等間隔で配列した状態で一体化されていることから、配置が容易でしかも感度についても電気的に光感度時間を変えられるので調整も容易である。

【0025】なお、本実施例では、各書込手段20に対して複数のCCDユニット22を用いているが、1つのCCDユニット22を図示しない移動ステージに取り付けて主走査方向Yに移動させ、所望の像高で光束L'が通過する画素位置を調べることによっても測定が可能である。この場合、必要なセンサの数が減りこの点でのコスト低減に有利である。

【0026】また、本実施例では、ラインCCD22aの画素列方向が感光体面1aでの走査位置ずれを特定可能なX方向に一致しY方向に直交しているが、この画素列方向はX方向と完全に一致せず、むしろXY平面内にあってX方向と交わるがY方向に直交しないように傾けるとよい。こうすれば感光体面1aにおける副走査方向Z(ラインCCDではX方向に現れる)に対する画素ピッチが狭まり画素間隔が細くなったのと同じ効果が得られ、走査線曲がりの測定精度が向上するのである。

【0027】図3は、走査線曲がりの補正手段を備えた書込手段20の断面図である。ここでいう補正手段は、ハーフミラー29へ達する前のレーザ光束を屈折させてこの光軸位置を変えた光軸移動手段を有し、この光軸移動手段を上記制御部51にて駆動制御することにより走査用レンズ28a、28bに入射するレーザ光束の副

走査方向高さを変え、各書込手段20間での走査線曲がり量を一致させる。

【0028】本実施例における上記光軸移動手段は、走査用レンズ28aの手前に設けられた長方形断面の透明部材31である。この透明部材31は、長手方向が主走査方向Yに一致し、前面と後面とが略平行の平行屈折面31aを有するものである。透明部材31はこの中心近傍を通る主走査方向Yを軸として回動自在であり、これにより平行屈折面31aは前面と後面とが共に光軸に対して所定の角度を持つようになっている。

【0029】そして、上記ポリゴンミラー21で偏向されたレーザ光束は、防音ガラス27を経て透明部材31を通過し、このとき透明部材31の回転角度により設定される前後の平行屈折面31aによりレーザ光軸の副走査方向Zが平行に移動される。副走査方向Zへ平行移動したレーザ光束は、走査用レンズ28a、28bを通過して最終的に感光体面1a上では走査線曲がり量の変化となって現れる。

【0030】一方、走査線の曲がり量は、上述したように上記ラインCCD22aの出力から制御部51で求められ、ここで走査線位置の正規値（理論値）あるいは各書込手段20間での比較により、制御偏差量が得られる。これは透明部材31に必要な操作量としての回転角度量に換算され、これによって透明部材31が駆動制御される。このようにして、各CCDユニット22で基準化される走査位置が各書込手段20間で一致するように透明部材31の回転角度を制御しこの前後2つの屈折面31aを介して、各走査線の曲がり量を揃えることにより色ずれ等を補正し、画像の品質を向上させることができる。

【0031】なお、上記平行平板等からなる透明部材31は全像高をカバーする必要がある。本発明に関わる透明部材31は、ポリゴンミラー21と走査用レンズ28aとの間に設置されており、この点では走査用レンズ28と感光体面1aとの間に設置する場合と比較して像高方向に必要とされる透明部材31の大きさが小さくて済み、その分コスト低減に有利である。

#### 【0032】

【発明の効果】以上説明したように、本発明の画像形成装置は、各書込手段で走査されるレーザ光束をCCDセンサへ導くことによって、各書込手段の走査線曲がり量を測定する測定手段を備えた構成なので、上記CCDセンサによって各書込手段ごとの走査線の曲がり量を比較的安価且つ容易に測定でき、これにより各像を重ね転写して得られる画像の品質を劣化させないために、どの書込手段の走査線の曲がり量をどの程度補正する必要があるかなどを知ることができる。

【0033】上記測定手段が、上記光偏向手段で偏向されるレーザ光束を、感光体面に入射する第1の光束と、

上記CCDセンサに入射する第2の光束とに分割する光束分離手段を有する構成によれば、該光束分離手段により、各書込手段は画像形成可能な状態のまま走査線の曲がり量を測定できる。

【0034】上記第1の光束が主走査方向に偏向されたときの第2の光束の移動軌跡上に沿って複数のCCDセンサを配置した構成によれば、該複数のCCDセンサを主走査方向に並べるので、可動部の少ない簡単な機構で走査線曲がり量を測定できる。

10 【0035】各書込手段に対して少なくとも1つのCCDセンサが配置され、該CCDセンサを第2の光束の移動軌跡上に沿って移動させる移動手段を備えた構成によれば、各書込手段に必要なCCDセンサが1つのみなので、これを複数設ける場合よりコストを低減できる。

【0036】上記CCDセンサが、上記第2の光束の光軸と略垂直な平面内にある画素列の並び方向が第2の光束の移動軌跡と交わり且つ直交しないように設置された構成によれば、上記第2の光束の移動軌跡方向と直交する場合より、上記移動軌跡の副走査位置を特定する方向での画素列ピッチが狭まりラインCCDの測定分解能が高くなるので測定精度が向上する。

【0037】さらに、上記走査線の曲がり量を補正する補正手段を備えた構成によれば、各書込手段で生じた走査線の曲がり量を補正することにより重ね転写画像における色ずれ等の品質劣化を抑えられる。

#### 【図面の簡単な説明】

【図1】本実施例の画像形成装置の概略構成を示す断面図である。

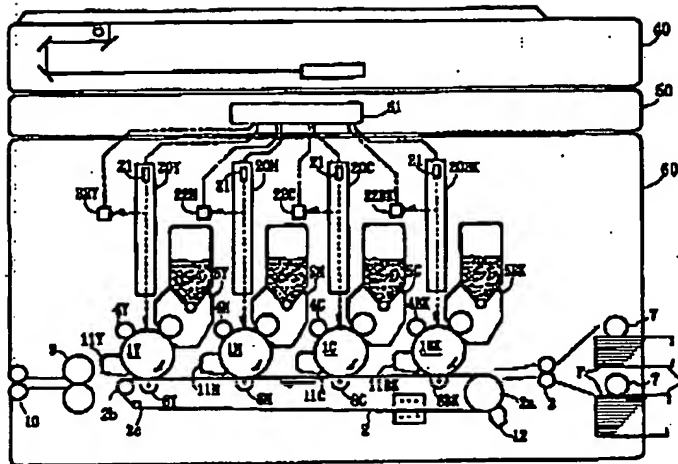
【図2】本実施例に関わる書込手段の構成を示す図で、(a)は断面図、(b)は平面図である。

30 【図3】走査線曲がりの補正手段を備えた書込手段の断面図である。

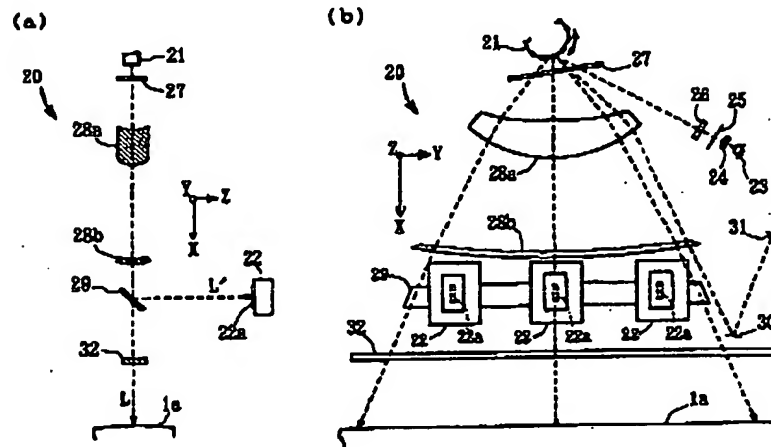
#### 【符号の説明】

1	感光体
1a	感光体面
20	書込手段
21	ポリゴンミラー（光偏向手段）
22a	ラインCCD（CCDセンサ）
23	半導体レーザ（光源）
28	走査用レンズ
29	光束分離手段、ハーフミラー
31	透明部材
31a	透明部材の屈折面
L	第1の光束
L'	第2の光束
P	転写紙（転写材）
Y	主走査方向
Z	副走査方向

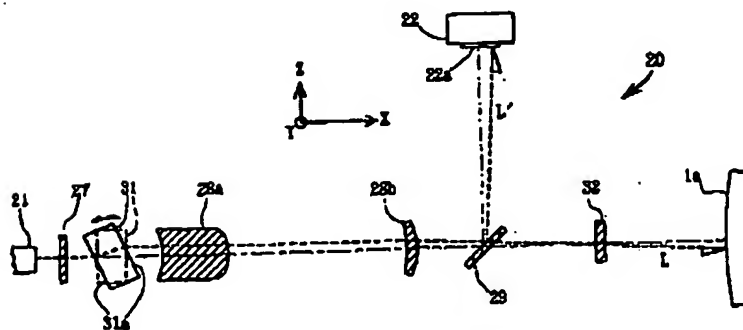
【図1】



【図2】



【図3】



# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2001-117033

(43)Date of publication of application : 27.04.2001

(51)Int.Cl.

G02B 26/10

(21)Application number : 11-294416

(71)Applicant : RICOH CO LTD

(22)Date of filing : 15.10.1999

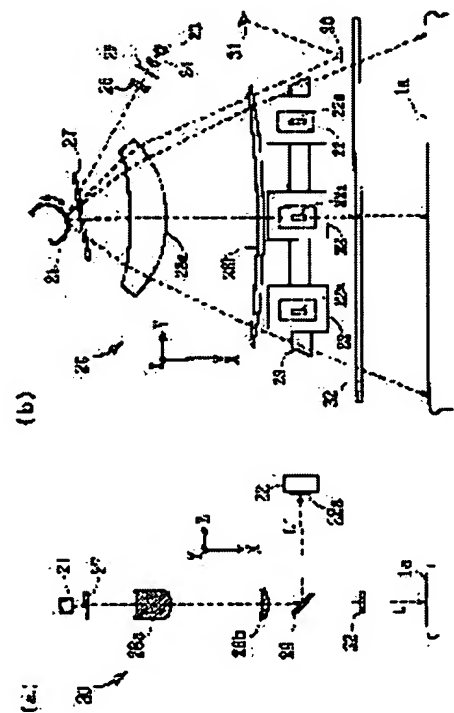
(72)Inventor : UEDA TAKESHI

## (54) IMAGE FORMING DEVICE

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a color image forming device capable of correcting the difference of color or color slurring by measuring the bend of the scanning line of a write means.

SOLUTION: This image forming device is provided with plural photoreceptors and plural write means 20 independently performing laser scanning to the respective photoreceptors, and electrostatic latent images on the respective photoreceptors formed by the scanning of the write means 20 are developed to the developed images of respective colors, then the developed images of the respective colors are successively superposed and transferred to transfer material. The device is equipped with a control means by which a scanning position in a subscanning direction Z at each image height is relatively measured by dividing the luminous flux for scanning by the write means 20 by the use of a half mirror 29 and guiding either luminous flux L' of divided ones to a CCD sensor 22, and the bend of the scanning line is corrected by turnably providing a parallel refractive surface on the front side of a half mirror.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the

examiner's decision of rejection or application  
converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of  
rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]



## \* NOTICES \*

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## CLAIMS

---

[Claim(s)]

[Claim 1] It has the photo conductor in which two or more revolutions are free, and two or more write-in means to perform a laser scan independently to each of the rotating photo conductor. At least this write-in means The light source, It consists of an optical deflection means to deflect the laser beam bundle from this light source to a main scanning direction, and a lens for a scan which carries out image formation of the laser beam bundle to deflect to a photo conductor side. In the image formation equipment which piles up and imprints \*\*\*\* of each of this color on imprint material after developing the electrostatic latent image on each photo conductor formed of the laser scan of the write-in means of each above to corresponding \*\*\*\* of each color Image formation equipment characterized by having a measurement means to measure the scanning-line deflection of each write-in means by leading the laser beam bundle scanned with each above-mentioned write-in means to a CCD sensor.

[Claim 2] Image formation equipment according to claim 1 with which the above-mentioned measurement means is characterized by having a flux of light separation means to divide the laser beam bundle deflected with the above-mentioned optical deflection means into the 1st flux of light which carries out incidence to a photo conductor side, and the 2nd flux of light which carries out incidence to the above-mentioned CCD sensor.

[Claim 3] Image formation equipment according to claim 2 characterized by the above-mentioned flux of light separation means being the half mirror prepared between the above-mentioned optical deflection means and the photo conductor side.

[Claim 4] Image formation equipment according to claim 2 or 3 characterized by having arranged two or more CCD sensors along the migration locus top of the 2nd flux of light when the 1st flux of light of the above is deflected by the main scanning direction.

[Claim 5] Image formation equipment according to claim 2 or 3 characterized by having the migration means to which at least one CCD sensor is arranged to each write-in means, and this CCD sensor is moved along the migration locus top of the 2nd flux of light of the above.

[Claim 6] the above-mentioned CCD sensor -- the optical axis of the 2nd flux of light of the above, and abbreviation -- image formation equipment given in either of claims 2-5 to which the direction of a list of the pixel train in a vertical flat surface is characterized by the migration locus of the 2nd flux of light of the above, the intersection, and being installed so that it may not intersect perpendicularly.

[Claim 7] Furthermore, image formation equipment given in either of claims 1-6 characterized by having an amendment means to amend the deflection of the above-mentioned scanning line.

[Claim 8] The above-mentioned amendment means is image formation equipment according to claim 7 characterized by enabling adjustment of the amount of deflection of the scanning line which is made to carry out detailed migration of the optical axis of the laser beam bundle deflected with the above-mentioned optical deflection means in the direction of vertical scanning, and carries out image formation to the photo conductor of this laser beam bundle.

[Claim 9] The above-mentioned amendment means is image formation equipment according to claim 8 characterized by being what adjusts the amount of deflection of the scanning line by having the transparence member equipped with the refracting interface which bends the laser beam bundle which it is installed between the above-mentioned optical deflection means and the above-mentioned lens for a scan, and is penetrated along the direction of vertical scanning, and leaning this transparence member.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## DETAILED DESCRIPTION

---

### [Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the image formation equipment which has two or more sets of write-in means (optical scan system), and a written in means (photo conductor), piles up the image formed in each \*\*\*\*\* means about electrophotography-type image formation equipment, such as a laser beam printer and a digital plain paper copier, and forms an image.

[0002]

[Description of the Prior Art] The information on a color that plurality changed with two or more write-in means independently to two or more photo conductors by which revolution actuation is carried out with a drive is written in image formation equipments, such as a laser beam printer, with the scanning line, respectively, an electrostatic latent image is formed, and there are image formation equipments, such as a digital color copying machine which develops these electrostatic latent images to \*\*\*\* of the color which changed with two or more development means, respectively, piles up and imprints on imprint material, and obtains a color picture. Each of the above-mentioned write-in means carries out outgoing radiation of the laser beam bundle from the semiconductor laser by which actuation control is carried out according to the image information signal of each color by which reading appearance is carried out. A laser beam bundle is scanned in the direction of image quantity while being condensed by the photo conductor side uniformly charged through optics, such as a polygon mirror and a lens. And image information is written in the photo conductor side to rotate as the scanning line of a predetermined pitch, and an electrostatic latent image is formed in it.

[0003] Conventionally, with the color picture formation equipment equipped with the laser beam scanner as two or more write-in means as mentioned above, a gap may occur in the lens and light source location in a scanner by considering a temperature change etc. as a cause in each write-in means. Thus, if an inner lens and an inner light source location shift, the migration locus of the laser spot on a scan layer-ed, i.e., the deflection of the scanning line, will change. When the deflection of the scanning line of a laser beam bundle differed with the write-in means of each color, there was nonconformity to which a difference and a color gap of a tint take place by a gap of image spacing of a different color or the lap, and the quality of a color picture falls.

[0004] In order to prevent this kind of nonconformity, as a measuring method of the deflection of the above-mentioned scanning line, the method of turning to an imprint belt the reflective mold photosensor which consists of the light emitting device and photo detector to construct [ two or more ], arranging it, catching \*\*\*\* on an imprint belt by the photo detector, and measuring a gap of \*\*\*\* is well-known so that it may be indicated by JP,9-90695,A, for example.

[0005]

[Problem(s) to be Solved by the Invention] However, by the measuring method given [ above-mentioned ] in JP,9-90695,A, in order to distinguish and catch \*\*\*\* of that the light source which illuminates \*\*\*\* is needed, and four colors, each photo detector corresponding to a color is needed, and equipment serves as the cost high.

[0006] Then, this invention is equipped with the cheap means for measuring change of the scanning-line deflection of the laser beam bundle in each write-in means, and aims at offering the image formation equipment which can amend the difference and color gap of a tint by change of scanning-line deflection further.

[0007]

[Means for Solving the Problem] The image formation equipment of this invention which attains the above-mentioned object It has the photo conductor in which two or more revolutions are free, and two or more write-in means to perform a laser scan independently to each of the rotating photo conductor. At least this write-in

means The light source, It consists of an optical deflection means to deflect the laser beam bundle from this light source to a main scanning direction, and a lens for a scan which carries out image formation of the laser beam bundle to deflect to a photo conductor side. In the image formation equipment which piles up and imprints \*\*\*\* of each of this color on imprint material after developing the electrostatic latent image on each photo conductor formed of the laser scan of the write-in means of each above to corresponding \*\*\*\* of each color By leading the laser beam bundle scanned with each above-mentioned write-in means to a CCD sensor, it has a measurement means to measure the scanning-line deflection of each write-in means, and is characterized by \*\*.

[0008] The above-mentioned measurement means can consider as the configuration which has a flux of light separation means to divide the laser beam bundle deflected with the above-mentioned optical deflection means into the 1st flux of light which carries out incidence to a photo conductor side, and the 2nd flux of light which carries out incidence to the above-mentioned CCD sensor. In this case, the above-mentioned flux of light separation means can make it the configuration which prepares a half mirror between the above-mentioned optical deflection means and a photo conductor side.

[0009] It can consider as the configuration which has arranged two or more CCD sensors along the migration locus top of the 2nd flux of light when the 1st flux of light of the above is deflected by the main scanning direction. Or it is good also as a configuration equipped with the migration means to which at least one CCD sensor is arranged to each write-in means, and this CCD sensor is moved along the migration locus top of the 2nd flux of light. moreover -- in this case -- each CCD sensor -- the optical axis of the 2nd flux of light of the above, and abbreviation -- the direction of a list of the pixel train in a vertical flat surface is easy to make it the 2nd migration locus, intersection, and configuration installed so that it might not intersect perpendicularly of the flux of light.

[0010] Furthermore, it can be made the configuration equipped with an amendment means to amend the deflection of the above-mentioned scanning line. In this case, this amendment means can be considered as the configuration whose adjustment of the amount of deflection of the scanning line which is made to carry out detailed migration of the optical axis of the laser beam bundle deflected with the above-mentioned optical deflection means in the direction of vertical scanning, and carries out image formation to the photo conductor of this laser beam bundle was enabled. Moreover, in this case, the above-mentioned amendment means has the transparency member equipped with the refracting interface which bends the laser beam bundle which it is installed between the above-mentioned optical deflection means and the above-mentioned lens for a scan, and is penetrated along the direction of vertical scanning, and can make it the configuration which adjusts the amount of deflection of the scanning line by leaning this transparency member.

[0011]

[Embodiment of the Invention] Hereafter, one example of this invention is explained based on a drawing. Drawing 1 is the outline block diagram of the image formation equipment of this example. The inside of this image formation equipment consists of the image read station 40, the image-processing section 50, and the printer section 60, and it is arranged at the printer section 60 so that 4 sets of imaging equipment constituted with the write-in means 20, the drum-like photo conductor 1, and the imaging components of the circumference of this photo conductor 1 may be located in a line on the imprint belt 2. The imaging equipment of these plurality shares black ("BK" shows below), cyanogen ("C" shows below), a Magenta ("M" shows below), and each color imaging process of yellow ("Y" shows below) sequentially from the drawing 1 Nakamigi hand. Here, the configuration and a series of imaging actuation of this equipment are outlined first.

[0012] With each imaging equipment, a full color image is obtained because each forms \*\*\*\* of four colors of BK, C, M, and Y and piles up and imprints \*\*\*\* of each color by which sequential formation is carried out to imprint material. For this reason, revolution actuation is carried out through driving roller 2a by driving roller 2a and follower roller 2b, and the driving source that it is laid [ firmly ] across 2c and illustrated, and the imprint belt 2 conveys the imprint material sent from the resist roller 3. In addition, although it is the configuration of piling up \*\*\*\* of four colors of BK, C, M, and Y, 1 set of recording devices are omitted among these 4 sets of recording devices, \*\*\*\* of three colors is piled up, and you may make it obtain a color picture in this example.

[0013] For example, with the recording device which forms C \*\*\*\*, photo conductor 1C is charged in homogeneity with the electrification means which revolution actuation is carried out with the drive which is not illustrated to the clockwise rotation in drawing 1 (it will be the direction of vertical scanning if it sees from

write-in means 20C); and consists of electrification charger 4C, and an electrostatic latent image is formed by exposure by write-in means 20C. Write-in means 20C carries out outgoing radiation of the laser beam by which carried out actuation control of the light source by the laser actuation control section with the digital picture signal of C from the image-processing section 50, and intensity modulation was carried out with the digital picture signal of C, deflects this laser beam bundle repeatedly to a main scanning direction (shaft orientations of a photo conductor 1) with the optical deflection means which consists of a polygon mirror 21, writes the information on C in photo conductor 1C as the scanning line, and forms an electrostatic latent image here. Like latent-image formation of Above C, moreover, in other recording devices Revolution actuation is carried out and photo conductor 1BK, and 4M and 4Y are charged in homogeneity by each electrification charger 4BK, and 4M and 4Y, respectively. An electrostatic latent image is written in by the exposure corresponding [ BK / write-in means 20/ write-in means 20Y ] to the image information of each color in write-in means 20M to photo conductor 1Y to photo conductor 1M to photo conductor 1BK.

[0014] Moreover, the outline of a means to measure the laser beam of the above-mentioned write-in means 20BK - 20Y is as follows. it is alike, respectively and CCD unit 22BK which consists of a CCD sensor, and 22C, 22M and 22Y are arranged at the write-in means 20BK - 20Y side of each above. And a part of laser beam bundle which faces to a photo conductor 1 is led to each CCD unit 22BK - 22Y from the inside of each write-in means 20BK-20Y. Each [ these ] write-in means 20 and each CCD sensor 22 are connected to the control section 51 which consists of arithmetic units, such as CPU.

[0015] The electrostatic latent image on photo conductor 1C is developed by the next of latent-image formation with 2 component developer which consists of 1 component developer or C toner which consists of a C toner by developer 5C as a development means, and a carrier, and becomes it with \*\*\*\* of C. like formation of this C \*\*\*\*, the electrostatic latent image on photo conductor 1BK, 1M, and 1Y is developed, respectively with the developer which contains BK toner, M toner, and Y toner by each, developer 5BK, and 5M and 5Y, and turns into \*\*\*\* of BK, M, and Y.

[0016] The imprint material which consists of a transfer paper P by the feed koro 7 is fed to the resist roller 3 from either of two sheet paper cassettes 6 with the above-mentioned image formation actuation. As the resist roller 3 takes timing with the image formation on each photo conductor 1, it sends out a transfer paper P to the imprint belt 2, and the imprint belt 2 conveys a transfer paper P in the heat fixing roller 9 direction. In case the transfer paper P on the imprint belt 2 passes the nip section of photo conductor 1BK, and 1C, 1M and 1Y, by imprint charger 8BK, and 8C, 8M and 8Y [ the imprint belt 2, and ] One by one, BK \*\*\*\* on photo conductor 1BK, C \*\*\*\* on photo conductor 1C, M \*\*\*\* on photo conductor 1M, and Y \*\*\*\* on photo conductor 1Y are imprinted, and a full color image is formed in a printing side. Then, it is fixed to a toner by the heat fixing roller 9, and a transfer paper P is discharged as a color copy with the delivery roller 10 outside.

[0017] Moreover, photo conductor 1BK, and 1C, 1M and 1Y are cleaned by cleaning equipment 11BK, and 11C, 11M and 11Y after a \*\*\*\* imprint, respectively, and a residual toner is removed. Moreover, cleaning equipment 12 cleans the imprint belt 2 after transfer paper conveyance.

[0018] Hereafter, the measurement means of the laser scan location of the above-mentioned image formation equipment and the amendment means of a laser scan location are explained to a detail.

[0019] Drawing 2 is drawing showing the configuration of the write-in means 20 circumference of drawing 1, this drawing (a) is a sectional side elevation, and this drawing (b) is a top view. As shown in these drawings, through a collimate lens 24, aperture 25, a cylindrical lens 26, and soundproof glass 27, by the motor which is not illustrated, the laser beam bundle emitted from the light source which consists of semiconductor laser 23 reaches the polygon mirror 21 by which revolution actuation is carried out, and is deflected. The deflected laser beam bundle passes along soundproof glass 27 again, and attains it through the lenses 28a and 28b for a scan to the half mirror 29 which is a flux of light separation means.

[0020] As shown in drawing 2 (a), image formation of the 1st flux of light L which penetrated the half mirror 29 among the laser beam bundles which reached the half mirror 29 is carried out to photo conductor side 1a which is a scan layer-ed through protection-against-dust glass 32, it writes in the scanning line and, on the other hand, 2nd flux of light L' reflected by the half mirror 29 carries out incidence to the CCD unit 22.

[0021] As shown in drawing 2 (b), predetermined spacing is opened in a main scanning direction Y (the direction of image quantity), and three CCD units 22 are installed. That is, these CCD units 22 arrange in parallel line CCD22a as a light sensing portion on the scan locus of flux of light L' of the above 2nd accompanying the scan of the 1st flux of light L deflected by the polygon mirror 21. Incidence of the 2nd flux

of light L' deflected by the polygon mirror 21 will be carried out to three CCD units 22 one after another, and it will repeat this for every scan layer of the polygon mirror 21. In addition, some laser shaken among the 1st flux of light L to the end side of a main scanning direction Y carries out incidence to the synchronous sensor 31 through a mirror 30 by return.

[0022] In this example, a half mirror 29 is formed along a main scanning direction Y, and the flux of light from the polygon mirror 21 is mostly divided into a right angle. therefore, each line CCD22a -- a half mirror 29 -- it is attached so that predetermined distance alienation may be carried out in the width Z of vertical scanning, i.e., the direction, and it may be vertically turned immediately to it to laser beam bundle L' and it may rank with a main scanning direction X at equal intervals.

[0023] Moreover, the pixel train of each line CCD22a is in a vertical flat surface to the optical axis of 2nd flux of light L', and the direction of a list of this pixel is arranged in the direction of X in alignment with the optical axis of the 1st flux of light L. That is, the vertical-scanning location of the scanning line which the 1st flux of light L writes in photo conductor side 1a is relatively pinpointed by the pixel location of the direction of X as for which 2nd flux of light L' carries out image formation. Therefore, if the Mitsushige alignment of the direction of X on line CCD22a is measured, it will become a thing reflecting the vertical-scanning location of the scanning line in the image quantity. And each output of the CCD unit 22 prepared in three in a scan field is incorporated by the control section 51, the vertical-scanning location in each image quantity is pinpointed, and the deflection of the scanning line is measured.

[0024] Moreover, since measurement of the deflection of the scanning line is attained by leading a laser beam bundle to direct line CCD22a by the configuration using the above-mentioned half mirror 29, without establishing the special light source and it is measured at the process before developing every write-in means 20, the cheap photo detector for monochrome which consists of CCD is sufficient. Moreover, since the pixel is unified in the condition of having arranged at equal intervals, from the first, a CCD sensor is easy to arrange, and since the optical storage time is moreover electrically changed also about sensibility, it is easy [ sensor ] to adjust.

[0025] In addition, in this example, although two or more CCD units 22 are used to each write-in means 20, it can attach in the migration stage which does not illustrate one CCD unit 22, can be made to be able to move to a main scanning direction Y, and can measure also by investigating the pixel location through which flux of light L' passes in desired image quantity. In this case, the number of required sensors becomes fewer and it is advantageous to the cost reduction in this point.

[0026] Moreover, although this direction of a pixel train is not made in agreement as thoroughly as the direction of X although the direction of a pixel train of line CCD22a lies at right angles in the direction of Y in this example in accordance with the direction of X which can specify the scan location gap by photo conductor side 1a, but it is in XY flat surface rather and the direction of X is crossed, it is good to lean so that it may not intersect perpendicularly in the direction of Y. If it carries out like this, the effectiveness as having become fine that narrowing pixel spacing has the same pixel pitch to the direction Z of vertical scanning in photo conductor side 1a (it appears in the direction of X with Line CCD) will be acquired, and the accuracy of measurement of scanning-line deflection will improve.

[0027] Drawing 3 is the sectional view of the write-in means 20 equipped with the amendment means of scanning-line deflection. An amendment means here has the optical-axis migration means which the laser beam bundle before reaching to a half mirror 29 was made refracted, and made this optical-axis location adjustable, changes the direction height of vertical scanning of the laser beam bundle which carries out incidence of this optical-axis migration means to the lenses 28a and 28b for a scan by carrying out actuation control by the above-mentioned control section 51, and makes in agreement the amount of scanning-line deflection between each write-in means 20.

[0028] The above-mentioned optical-axis migration means in this example is the transparence member 31 of the rectangular section prepared before lens 28a for a scan. As for this transparence member 31, a longitudinal direction has parallel refracting interface 31a of abbreviation parallel of a front face and a rear face in accordance with a main scanning direction Y. The transparence member 31 can be freely rotated centering on the main scanning direction Y which passes near [ this ] the core, and, thereby, as for parallel refracting interface 31a, a front face and a rear face have a predetermined include angle to both opticals axis.

[0029] And since the laser beam bundle deflected by the above-mentioned polygon mirror 21 should pass soundproof glass 27, it passes the transparence member 31, and the direction Z of vertical scanning of a laser

beam shaft is moved to parallel by parallel refracting interface 31a before and after setting up with angle of rotation of the transparence member 31 at this time. Through the lenses 28a and 28b for a scan, eventually, on photo conductor side 1a, the laser beam bundle which carried out the parallel displacement serves as change of the amount of scanning-line deflection in the direction Z of vertical scanning, and appears to it.

[0030] On the other hand, the amount of deflection of the scanning line is calculated by the control section 51 from the output of the above-mentioned line CCD22a, as mentioned above, and the amount of system deviation is obtained by the comparison between the value (theoretical value) of the normal of a scanning-line location, or each write-in means 20 here. This is converted into the amount of angle of rotation as a control input required for the transparence member 31, and actuation control of the transparence member 31 is carried out by this. Thus, by controlling angle of rotation of the transparence member 31, and arranging the deflection of each scanning line through two refracting interface 31a approximately [ this ] so that the scan location scaled in each CCD unit 22 may be in agreement between each write-in means 20, a color gap etc. can be amended and the quality of an image can be raised.

[0031] In addition, the transparence member 31 which consists of the above-mentioned parallel plate etc. needs to cover all image quantities. The transparence member 31 in connection with this invention is installed between the polygon mirror 21 and lens 28a for a scan, its magnitude of the transparence member 31 needed in the direction of image quantity as compared with the case where it installs between the lens 28 for a scan and photo conductor side 1a is small, it can be managed with this point, and is advantageous to that part cost reduction.

[0032]

[Effect of the Invention] As explained above, the image formation equipment of this invention Since it is the configuration equipped with a measurement means to measure the scanning-line deflection of each write-in means by leading the laser beam bundle scanned with each write-in means to a CCD sensor In order not to degrade the quality of the image which can measure comparatively cheaply and easily the deflection of the scanning line for every write-in means, piles up each image by this, imprints, and is obtained by the above-mentioned CCD sensor, it can know it is necessary how many deflection of the scanning line of which write-in means to amend.

[0033] According to the configuration which has the flux of light separation means which the above-mentioned measurement means divides into the 1st flux of light which carries out incidence of the laser beam bundle deflected with the above-mentioned optical deflection means to a photo conductor side, and the 2nd flux of light which carries out incidence to the above-mentioned CCD sensor, each write-in means can measure the deflection of the scanning line with this flux of light separation means with the condition in which image formation is possible.

[0034] According to the configuration which has arranged two or more CCD sensors along the migration locus top of the 2nd flux of light when the 1st flux of light of the above is deflected by the main scanning direction, since these two or more CCD sensors are arranged in a main scanning direction, scanning-line deflection can be measured by the easy device with little moving part.

[0035] At least one CCD sensor is arranged to each write-in means, and according to the configuration equipped with the migration means to which this CCD sensor is moved along the migration locus top of the 2nd flux of light, since it is one CCD sensor required for each write-in means, cost can be reduced from the case where two or more these is prepared.

[0036] the above-mentioned CCD sensor -- the optical axis of the 2nd flux of light of the above, and abbreviation -- since the resolution of measurement of a narrowing line CCD becomes [ the pixel row pitch in the direction which pinpoints the vertical-scanning location of the above-mentioned migration locus ] high, according to the 2nd migration locus, intersection, and configuration that were installed so that it may not intersect perpendicularly of the flux of light in the direction of the pixel train in a vertical flat surface of a list, the accuracy of measurement improves from the case intersect perpendicularly with the direction of the 2nd flux of light of the above of a migration locus.

[0037] Furthermore, according to the configuration equipped with an amendment means to amend the deflection of the above-mentioned scanning line, it piles up by amending the deflection of the scanning line produced with each write-in means, and quality degradation of the color gap in a transfer picture etc. can be suppressed.

---

[Translation done.]